Lesson Plan

Children's Health

In this lesson...

Grade Level

- Pre K-3

Main Ideas

- Pests can cause many problems for children and adults. Although insects can be pests, the term "pest" includes any animal, insect or plant that bothers people.
- The five principles of Integrated Pest Management (IPM), Exclusion, Sanitation, Monitoring, Treatment, and Evaluation, can be used to keep pests away safely.
- The air inside of our homes can be 2 to 5 times more polluted then outdoor air and can cause many adverse health effects.

Objectives

To effectively communicate to small children the ways in which their indoor environments affect their well-being.

Materials Needed

- Pipe cleaners
- Scotch tape
- Scissors
- Brown paper shopping bags
- Build-A-Bug template
- Lung Puppet templates
- Crayons (optional)
- Picture of a cockroach
- Good and Bad Things for Air supplement

Teacher Preparation

For use when a teacher is giving the presentation on his or her own

Overview

This presentation is designed to introduce some of IDEM's Children's Environmental Health programs to small children. Students will learn how Integrated Pest Management techniques are used to cut down on harmful pesticide usage, but still effectively eliminate household pests. They will also learn how indoor air quality can affect their health and what they can do to help protect our air.

Materials Needed

The following items should be gathered before beginning the presentation.

- Pipe cleaners (4 per student)
- Scissors (1 pair for each student)
- Crayons (enough to share)
- Scotch tape (enough to share)
- Brown paper shopping bags

Additional Resources

Check out the "Taking it further" section for other activities that can help you integrate this presentation into a larger lesson plan or thematic unit, follow-up the presentation with more activities, or simply give you ideas for future lesson plans.

The Indiana State Science Standards covered in this program have also been provided for you, allowing you to cover the standards with an environmental twist. Further, a glossary of terms covered in the presentation is provided with definitions.

Presenter Preparation

For IDEM staff members giving the presentation

Overview

This presentation is designed to introduce the Children's Environmental Health programs to small children. Students will learn how Integrated Pest Management (IPM) techniques are used to cut down on harmful pesticides but still effectively eliminate household pests. They will also learn how indoor air quality can affect their health and what they can do to help protect our air.

Materials Needed

You should prepare the materials you are to bring prior to your presentation. Contact Chad Trinkle at (317) 233-9479 with any questions you may have regarding where to find them or how to use them.

IDEM provides the following materials:

- Build-A-Bug template
- Lung Puppet templates

Presentation Tips

- Read through the presentation beforehand to become comfortable with the information presented and to identify any alterations you want to make.
- The outlined presentation is merely a rough guideline. You are not expected to get through all the information available; feel free to pick and choose which parts to present based on time constrictions, your personal preferences, and age of your audience.
- Preschoolers are more likely to get restless, so be sure to keep them entertained.
- Provide positive feedback to your audience as you go. Be sure to smile at them and encourage them to participate.
- Have fun! Instructor enthusiasm is contagious, especially with small children.

Lesson & Activities

A. Introduction

Although it is important for everyone, it is especially important for children to have a clean and healthy environment, both indoors and out.

First of all, children drink more water, eat more food, and breathe more air for their body size than adults do, which makes them more likely to be exposed to pollutants. Also, children's bodies and organs are still growing. Any damage that is done to them can affect them for the rest of their lives.

IDEM works to reduce children's exposure to various environmental threats such as lead, mercury, asbestos, mold, pesticides, and other asthma irritants.

B. Integrated Pest Management: Introducing Insects and Pests

Although an insect can be a pest, not all pests are insects.

Insects have six legs and a body made of three parts: the head, the thorax, and the abdomen. Some insects have wings and some don't. Scientists believe that there are more than 900,000 different kinds of insects in the world. Some of these insects are helpful to people are some can cause a lot of problems. Insects live in many different types of places and do different things, but they all need three important things to live: food, water, and shelter.

Pests are animals, insects, or plants that bother people. For example, the weeds in the lawn, and rats scurrying around garbage cans are pests. People spend a lot of money on getting rid of pests each year.

C. Integrated Pest Management: Indoors v. Outdoors

Pests can live inside or outside. It is important to know where different kids of pests live so that we can get rid of them without using dangerous chemicals.

Bugs belong outside, where they are supposed to live and be useful as food for other bugs or animals. However, bugs sometimes want to live inside of people's homes, where they can cause illnesses and steal and spoil food. They can make messes in our homes that cause kids to get sick with allergies and asthma. This is why bugs need to stay outside.

Cockroaches are one type of pest that tries to live in our homes.

Cockroaches are insects because they have a head, an abdomen, and a thorax but they are pests too, because when they try to live inside they cause a lot of problems. Cockroaches come in many shapes and sizes called species. In our country, there are four common species and one of them, the German cockroach, can be a really big problem because it spreads diseases. The other species are bad too though, because they leave flakes of their skin wherever they go. They also leave droppings on the food that they eat. If cockroaches live inside our homes and there is food that is not put away, the roaches will sneak out while you are sleeping and leave saliva, skin flakes, and droppings all over it. Scientists call this stuff frass.

Frass can cause big problems for people because not only does it make our homes dirty, it can induce asthma, which is a serious health problem and can make children very sick. Asthma is an illness that causes the lungs to tighten up. Breathing becomes so difficult at times that hospital treatment is necessary. Children can suffer from asthma because the frass that the cockroaches leave irritates their lungs and makes them close up.

The Principles of Integrated Pest Management (IPM)

IDEM has a program called Integrated Pest Management, or IPM, that works to get rid of pests in a way that is both safe for the environment and effective.

IPM uses non-chemical and chemical methods to get rid of pests. The five principles of IPM are:

- ***Exclusion:*** Keep pests out by sealing cracks and crevices.
  Look for little spaces under the doors, windows, and walls, where roaches can sneak into your house or apartment. Roaches can fit through spaces as small as a dime, so make sure the spaces are filled with caulking putty and the gaps under the doors are closed off with weather strips.
- ***Sanitation:*** Keep our homes and buildings clean on a regular basis.
  Clean out areas where the roaches could be living. Crumbs should be cleaned up immediately, or roaches can follow them and infest the entire house. Wipe up spilled water and keep the faucets turned off. Roaches are good swimmers, and even one drop of water can satisfy a thirsty roach.
- ***Monitoring:*** Be aware of whether or not pests are present.
  Roaches like to hide in dark places like in corners and under heavy things like refrigerators. Food bits can fall into these places and give the roaches both a place to live and food to eat. Food must also be stored where roaches cannot get to it.
- ***Treatment:*** Select a treatment method for the particular pest that is least hazardous and most effective.
  The first three steps should be enough to make your bug count start dropping, but if more help is needed a roach trap would be a good purchase. These traps catch roaches and get rid of them. Baits can also be used in cracks and crevices to get rid of the bugs. However, only adults should use chemicals at home.
- ***Evaluation:*** Evaluate how well treatment worked and keep records of sanitation and/or chemical intervention.

Make sure you keep track of when you last treated your home for pests, how you took care of them, and what (if any) chemicals were used.

Activity # 1

Build-A-Bug/Hide-A-Bug activity, an activity for the entire class.

Purpose: To teach students the basic parts of a bug body, where bugs like to hide indoors, and how to safely get rid of them.

Materials: Build-a-bug templates, scissors, pipe cleaners, scotch tape, brown paper shopping bags

Instructions:

Using the "build-a-bug" template, have students assemble the cockroach body by tracing it onto the brown shopping sack and cutting it out. (Use pre-cut bug bodies for younger students). Next, use pipe cleaners to make legs and antennae for the bugs. Older students can poke these through, bending them in half for a roach that stands on its own. Younger students may need to have their pipe cleaners cut in half and taped to the bodies.

After the bugs have been built, split the classroom into two groups. One group becomes the pest control technicians while the other group hides their roaches. Have the pest control technicians wait outside the room while the other group hides their roaches. When all the children involved have hidden their roaches, call the pest control group back in to search for them. If time allows, you may reverse the roles and repeat the activity.

Discussion/ Follow-up: When building the roaches, make sure you re-emphasize the body parts of the insect body and what makes it an insect. While searching for the roaches, remind the students of where they like to hide and why. When a student finds a roach, discuss with the class what safe ways there are to get rid of roaches that hide in spots like that one.

D. Indoor Air Quality

Another problem that can affect children is indoor air quality.

We usually think of air pollution as being outdoors, but indoor air quality can actually be as much as 2 to 5 times more polluted than outdoor air. People in our country spend almost 90% of their time indoors, breathing indoor air. Because our houses and schools are enclosed spaces, the air becomes more stagnant and the pollutants become denser. There are many types of pollutants that can get into our indoor air, including pesticides, solvents from paint, mold, and dust. Some pollutants come in from outside sources such as idling car engines and nearby factories. Other pollutants come from our air ducts. No matter where they come from, these pollutants can make us sick.

Symptoms and Solutions to Indoor Air Quality Problems

Indoor air pollutants affect us in many ways.

Adverse health effects include rashes, sinus problems, congestion, asthma, coughing, sneezing, and headaches. Health problems vary depending on the person and on the type of pollutant. One group of people that are affected more, however, are children. Because children breathe in more air, weight for weight, than adults do air pollutants and the health problems they can cause are amplified for them.

Reducing indoor air pollutants

There are many ways in which we can reduce indoor air pollutants, as well.

Some solutions are as simple as being more careful and making a few lifestyle changes. Do not let the car idle in the garage next to the house, for example. Another way to get rid of some pollutants is to choose non-toxic cleaning products and chemicals to use indoors. Mold can be caused by too much humidity. By fixing these problems, as well as making mechanical adjustments to our ventilation system, we can cut down our indoor air pollutants considerably.

Activity #2

Lung Puppets, an activity for the entire class.

Purpose: To help students understand that some things in the air can be bad for people and some things in the air do no harm to our breathing.

Materials: Lung Puppet templates, scissors, crayons, tape, Good and Bad Things for Air supplement

Instructions:

Using the lung puppet template have students cut out lung puppets along the dotted line, fold them into lung shape and taped closed. They may color the good lung pink and the bad lung brown if time permits. Have students place the good lung on one hand and the bad lung on the other when finished. Now call out five or six things from the "good" and "bad" lists and ask the students to raise the appropriate puppet into the air as each one is mentioned.

Discussion/Follow-Up: Discuss how important it is for us to breathe properly. Explain that there are good and bad things for the air, and that the bad ones can make kids sick. Help them to understand the difference between the things that are bad and those that aren't.

Taking it Further

IDEM's presentations are designed to suit both the environmental scientist with no experience in the classroom and the experienced educator who wants to give his or her students a fresh learning experience.

However, there are a few things that the trained teacher can offer that are not possible to replicate in a short presentation. This section provides that teacher with additional activities that can be used in place of or in addition to the ones in the lesson.

Additional Activity #1

Buggy Broadway

Purpose: To teach students about the basics of integrated pest management through a role playing game.

Materials: Craft materials to make masks/costumes (optional)

Instructions: Choose students to play the following characters (you can eliminate/add-on if you wish):

Characters:

- Spray Can Sam: wants to spray chemicals everywhere to get rid of bugs.
- Bobby Bait: attracts pests away from building or house
- Fifi Flyswatter : swats flies before they land on food, doesn't like Spray Can Sam
- Rita Roach: likes to steal food, and leave messes that can cause diseases or illnesses
- Frank the Fly: likes to steal food, lay eggs in it and spread germs
- Morty Mouse: steals food, makes messes and damages stuff
- Andy Ant: steals food, annoys people because he brings friends with him
- Tracy Trap: likes to trap pests before they can do damage, doesn't like Spray Can Sam.
- Careless Crumb: never cleans up after himself, attracts pests
- Heather Human: feels sick a lot and doesn't know why, maybe allergies
- Maxwell Manager: teaches people IPM to better their lives, doesn't like pests or Spray Can Sam
- Billie Broom: feels neglected, would like to help Heather clean her house.
- Danny Drip: a water drop from a plumbing leak, friend to all pests
- Erika Exclusion: looks for and finds little holes in walls and windows to seal so bugs and pests can't get in. The bugs try to get past her and she blocks them (makes a fun game all by itself).
- Polly Parent: scolds Heather Human for trying to use toxic sprays that only adults should ever handle.

  NOTE: If you have more students that want to participate than roles, you can easily create "families" out of the pests (ex. The Drip family: Danielle, Daisy, Danny and Duke).

Setting: A house that has pest problems.

Situation: Heather Human is always sick, her asthma is bad and she is missing school. There are bugs in the kitchen stealing her food and creating havoc for her. She only knows one thing: sprays get rid of bugs. Enter Maxwell Manager. He teaches Heather that with careful cleaning and using traps and baits she will soon get rid of bugs, have a cleaner place, and less allergic problems. Maxwell introduces Erika, Billie, Bobby, Fifi, and Tracy to Heather who form a strong team dedicated to getting rid of pests, Danny Drip and Careless Crumb in their house. Maxwell tells Heather that this way of life has a name: Integrated Pest Management. All is well again in the house, and Heather's allergies go way down.

Discussion/Follow up: Ask the students what they liked and didn't like about the skit. Re-emphasize how it applies to real-life situations. If time allows let students switch roles and play again.

Additional Activity #2

Six-Legged Snack Time

Purpose: To help students learn that the insect body consists of three basic parts by creating a simple model.

Materials: Eleven tiny pretzel sticks, one mini-marshmallow, two regular marshmallows, and one paper towel per student.

Instructions: Give each student their materials. To make the insect model, take a pretzel stick and skewer one mini marshmallow followed by two regular marshmallows. This represents the head, thorax and abdomen, respectively. Now, use two pretzel sticks and push them into the head section at roughly 45 degrees of each other (a 'V' shape). These are the antennae. Next, take six pretzels and push them into the mid-section to create the legs. If all the legs are placed properly, the insect should stand by itself. The extra two pretzels can be used either in the event that one gets broken or challenge your students to use them as wings. Place the wings on the thorax section above the legs. You now have a simplified insect model. At the end of your lesson, you can invite the students to eat their insect! See bottom of page for finished model in figure 1.

Discussion/Follow-Up:

The insect body plan is made up of the head, thorax and abdomen. The head contains the eyes, mouth, and the antennae. The antennae serve to aid in finding food, mates and avoiding danger. The next segment is the thorax, which carries the wings and the legs. Finally, there is the abdomen, which carries the insect's vital organs and breathing tubes. This part may contain the stinger in some insects.

Have students match insect body segments (head, thorax, and abdomen) with their body parts. Help them name their body segments to show that even humans have some parts in common with insects.

Additional Activity #3

Red Light Green Light

Purpose: To help students understand chemical safety in the home by placing stickers on posters depicting areas within a home. In this activity a red light sticker for household safety means, "parents only" and a green light means, "OK for kids".

Materials: sheets of red and green 'dot' stickers (available at office supply stores), pictures or sketches of rooms in a house (our suggestion is to use a paper pad for use on easels).

Instructions:

Before you start, read the background information sheets provided concerning household chemical safety. These discuss the kinds of chemical hazards typically found inside a home and the areas within the house they are usually found in.

1. Draw simple sketches of the following rooms in a house: The kitchen (with sink cabinets less than four feet off the ground), the bathroom (with cleansing products either in sink cabinet, or on floor), the garage, the basement, and include any other room you think might contain toxic household chemical.
2. Once you have sketched those out, display them and begin discussing the rooms with the students.
   - What might we find in the kitchen that children should not touch?
   - What's under the sink in those cabinets?
   - Those cleaning products behind the toilet could hurt children, couldn't they?
   - How about the fridge? That's OK for kids, isn't it?
3. Create that kind of dialogue with your students to engage them in learning about home environmental issues. Even at their young age, they will understand that there are areas off limits to kids in a house. This should be reinforced at home with parents.
4. For the next segment of the activity, you will need to use the sticker sheets. Each kid should get a chance to come up to the board and place a sticker on one of the room posters. Place the red stickers on areas that are likely to contain products such as pesticides, medicines, household cleaners and chemicals that could harm kids. Place green stickers on benign areas such as a fridge or clothes hamper.

Discussion/Follow-Up: End the activity with a statement suggesting that children should always ask their parents for help when in the kitchen, bathroom, and any room besides their own. When it comes to insects in the house use swatters, flypaper, or baits instead of sprays and dusts.

Additional Activity #4

Ice Cream and Broccoli

Purpose: By learning about household pests, students are made aware of how to avoid some of the problems associated with them, and how to keep them out of the house.

Materials: Insect pest and attractant cards (5 x 7 index cards will work), pest fact sheets included in this lesson plan, adhesive tape, IPM fact sheets.

Instructions:

First, read the fact sheets to understand the pests involved and their attractants. Next, cut out the cards depicting pests and those depicting their attractant. Explain very simply that certain pests are attracted to things such as food, rotting food, water, etc. A good example is that kids generally prefer ice cream to broccoli when given the choice. Pests are the same way: They are attracted to some foods, and some don't attract them at all. Go through the list of pests and explain each one's attractant.

To begin the game, tape one card (either pest or attractant) to each student's back without allowing the students to see their own label. The students may only ask indirect "yes" or "no" questions to try to figure out "who" they are. For example: "Do I fly?", "Can I bite?" or "Am I good to eat?". As soon as a student has figured out their identity, they may announce it out loud, e.g. "I am a cockroach", or "I am food left out". If two students figure out that one is a pest and the other is a compatible match, they may pair up and help other students figure out what they are.

For younger students (Pre K- 1st grade) have them simply hold up their card and describe what they are. Have them talk about the characteristics of the insect or attractant on their card. For example: "I can fly", or "I sting/bite", or "I taste good, or smell bad". Once they are done describing the image on their card, lead the students to discover which pest or attractant their card would best pair up with.

Discussion/Follow-Up: Having read and understood IPM, conclude with the importance of IPM in schools and at home and why we use it. At snack time, discuss what kinds of snacks children like and what kinds of snacks they think insects like.

Attractant	Pest
Floor Drains	Fly
Pop Can	Yellow Jacket
Dirty Dishes	Cockroach
Rotting Food	Fruit Fly
Bare Earth	Weeds
Food	Roaches, Mice
Tire	Mosquito
Human Head	Head Lice
Ice Cream	Wasp/Ants
Meat	Yellow Jacket
School Building	Mouse
Trash Dumpster	Rat
Wet Wood	Termite
Flowers	Bees
Stack Of Papers	Spiders
Cardboard Box	Roaches, Mice

Indiana State Science Standards Covered in this Presentation (K-3)

Please Note

These Indiana State Science Standards apply only to the Lesson & Activities section of this lesson plan.
They do not apply to the Taking it Further: Additional Activities section.

Kindergarten

Scientific Inquiry

K.1.1 Raise questions about the natural world.

The Scientific Enterprise

K.1.2 Begin to demonstrate that everyone can do science.

Diversity of Life

K.4.1 Give examples of plants and animals.

K.4.2 Observe plants and animals, describing how they are alike and how they are different in the way they look and the things they do.

Models and Scale

K.6.1 Describe an object by saying how it is similar to or different from another object.

First Grade

Scientific Inquiry

1.1.1 Observe, describe, draw, and sort objects carefully to learn about them.

1.1.2 Investigate and make observations to seek answers to questions about the world, such as "In what ways do animals move?"

Diversity of Life

1.4.2 Observe and describe that there can be differences, such as size or markings, among the individuals within one kind of plant or animal group.

Interdependence of Life

1.4.3 Observe and explain that animals eat plants or other animals for food.

1.4.4 Explain that most living things need water, food, and air.

Models and Scale

1.6.1 Observe and describe that models, such as toys, are like the real things in some ways but different in others.

Second Grade

Interdependence of Life

2.4.2 Observe that and describe how animals may use plants, or even other animals, for shelter and nesting.

2.4.4 Recognize and explain that living things are found almost everywhere in the world and that there are somewhat different kinds in different places.

Systems

2.6.1 Investigate that most objects are made of parts.

Third Grade

Human Identify

3.4.8 Explain that some things people take into their bodies from the environment can hurt them and give examples of such things.

Models and Scale

3.6.3 Explain how a model of something is different from the real thing but can be used to learn something about the real thing.

Glossary of Children's Environmental Health Terms

Allergy

A sensitivity to certain terms, such as plants and animals. Allergies often cause sneezing, itching, and skin rashes.

Asthma

A disease that is sometimes brought on by allergies. It causes sudden recurring attacks of difficult breathing, chest constriction, and coughing.

Cockroach

Any of numerous oval, flat-bodied insects including several species that are common household pests.

Environment

The conditions that surround one; surroundings.

Evaluation

To examine and judge carefully.

Exclusion

Prevention of entering or coming in.

Frass

Waste materials produced by insects.

Insect

An animal with three main body parts (head, thorax, abdomen) and six legs.

Monitoring

Testing or sampling on an ongoing basis.

Pest

An injurious plant or animal, especially one harmful to humans.

Pesticide

A chemical used to kill pests, especially insects.

Pollutant

A waste material that contaminates air, soil, and water.

Sanitation

Keeping things clean to improve public health.

Species

A name for a group of living things that are in a category together because of things they have in common.

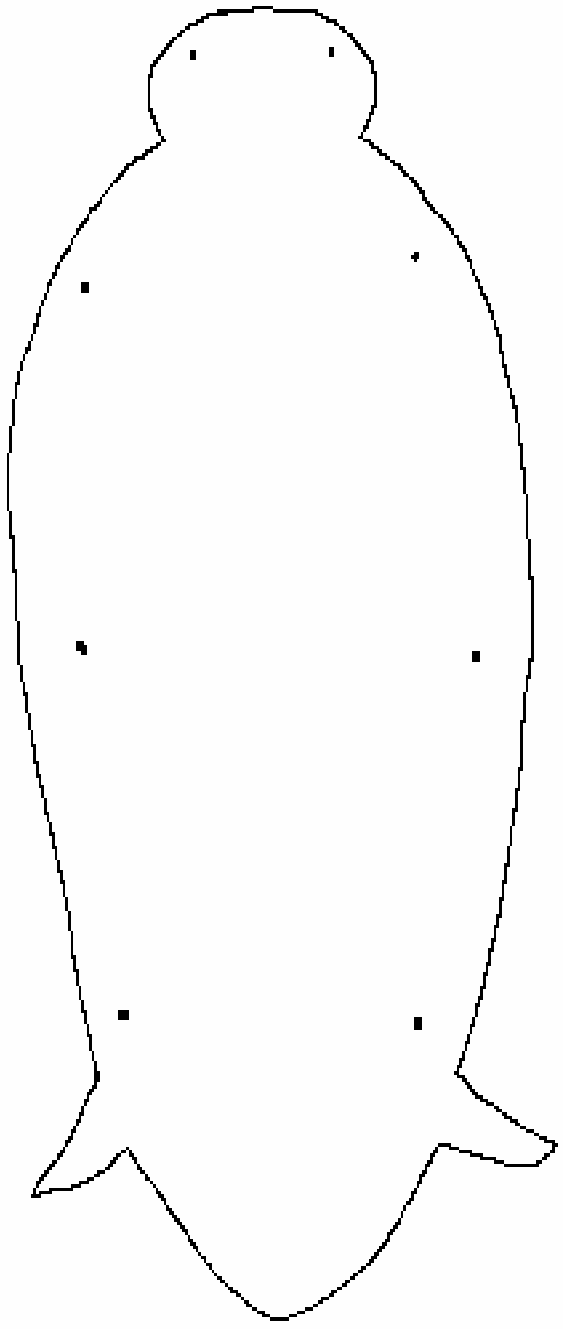
Additional Presentation Materials

- **Build-A-Bug Template**
- **Good & bad things for the air**
- **Lung puppet templates**

Attachment A: Build-A-Bug Template

Instructions:

1) Cut out shape along outline. Smaller children will probably need for you to cut for them, especially around the cerci (pronounced 'SIR - SEE'), horn-like feelers on the posterior end of the cockroach.
2) Tape legs and antennae at the dots.



Attachment B: Good & Bad things for the air

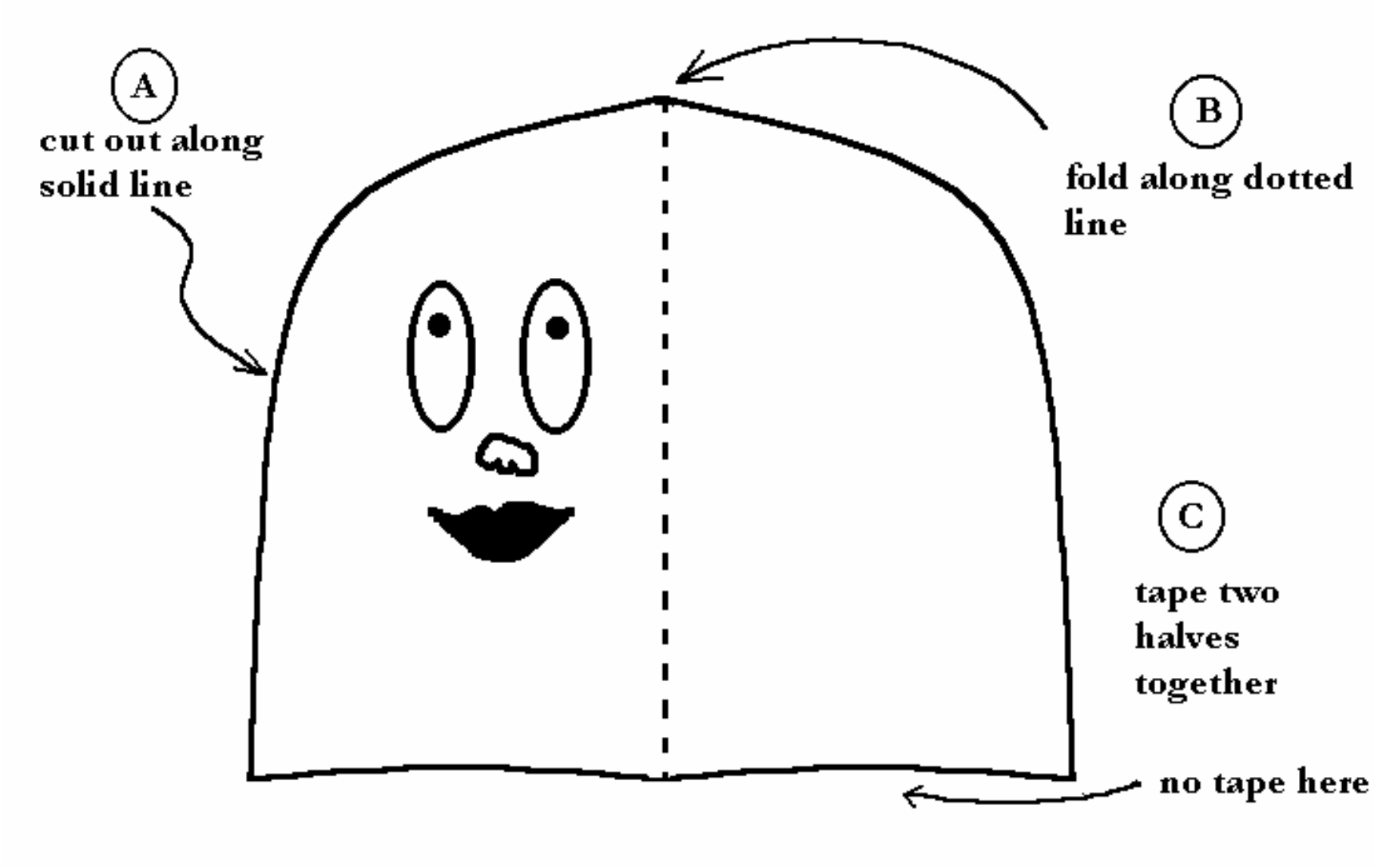
Good things for the air:

- Trees: provide oxygen and filter out soot and other particulates from the air.
- Flowers: provide oxygen, filter out soot and other particulates, and provide nice scents.
- Fresh air: is good for us to breathe.
- Open windows: provide fresh air into house and lets bad stuff out of the house.
- Backpacking: is better than driving everywhere.
- Combine trips: Make several errands in one car trip to save gas and create less pollution.
- Recycling: is good for the air because it takes a lot of energy to make new stuff, which creates pollution.
- Turn off the lights when done: to save energy, and burn less coal for new electricity.
- Rollerblade in a park.
- Walk.
- Plant new plants in the yard.
- Take the bus to work: Fewer cars on the road results in less pollution and congestion.
- Biking to work: is good for the lungs and heart, but stay away from heavy smog traffic.
- Alternative fuels: are less polluting and cause less soot and exhaust.

Bad things for the air:

- Car exhaust: outside is bad for you and can get into the house if someone is idling outside a window, or doorway.
- Industry: Factories create some pollution from their smokestacks.
- Lawn: Mowing creates exhaust.
- Lead dust: can come from old paint inside or outside a house and also from lead processing plants. This is a very serious problem which can lead to lead poisoning.
- Sulfur dioxide: Polluting gas from burning coal and fuel can cause breathing difficulties.
- Carbon monoxide: A colorless, odorless gas, comes from improperly adjusted gas ranges, water heaters, and gas-fired central heaters. It can be a serious problem indoors and can come inside from exhaust. It can suffocate someone if it is very concentrated indoors.
- Ozone: is also called smog. Chemicals produced by factories and vehicles, lawnmowers, etc are combined together by the action of sunlight to form ozone. Ozone can cause breathing difficulties and lung damage. Ozone up high in the sky is good for us and occurs naturally in a chemical reaction that has nothing to do with human activity. Ozone in the upper atmosphere protects us from harmful UV radiation.
- Particulate matter: is a problem both indoors and outdoors and is due to the burning of wood, and diesel oil. It also comes from dust on roads, construction, some farms, and burning yard waste. It can cause breathing problems.

- Asbestos: is found in insulative material that becomes brittle with age and releases microscopic dust fibers. These fibers can get into your lungs and cause breathing difficulties, and possibly even lung cancer. It is found on heating ducts in old houses, some linoleum tiles, dropped-ceiling tiles all in older homes.
- Household products: include sprays, fogs, and other cleaning products which can become airborne and cause illness if not properly vented.
- Secondhand tobacco smoke: Smoke that results from the burning of tobacco. It can become a serious health problem inside a house.
- Pesticides: Used improperly indoors (or outdoors), they can make people quite sick. These include sprays, foggers, etc…
- Mold: Mold loves wet places in a house. Mold causes serious health problems, including asthma and allergies.
- Pet dander: Dander is the flakes that fall off house pets. Dander can cause illness and allergies.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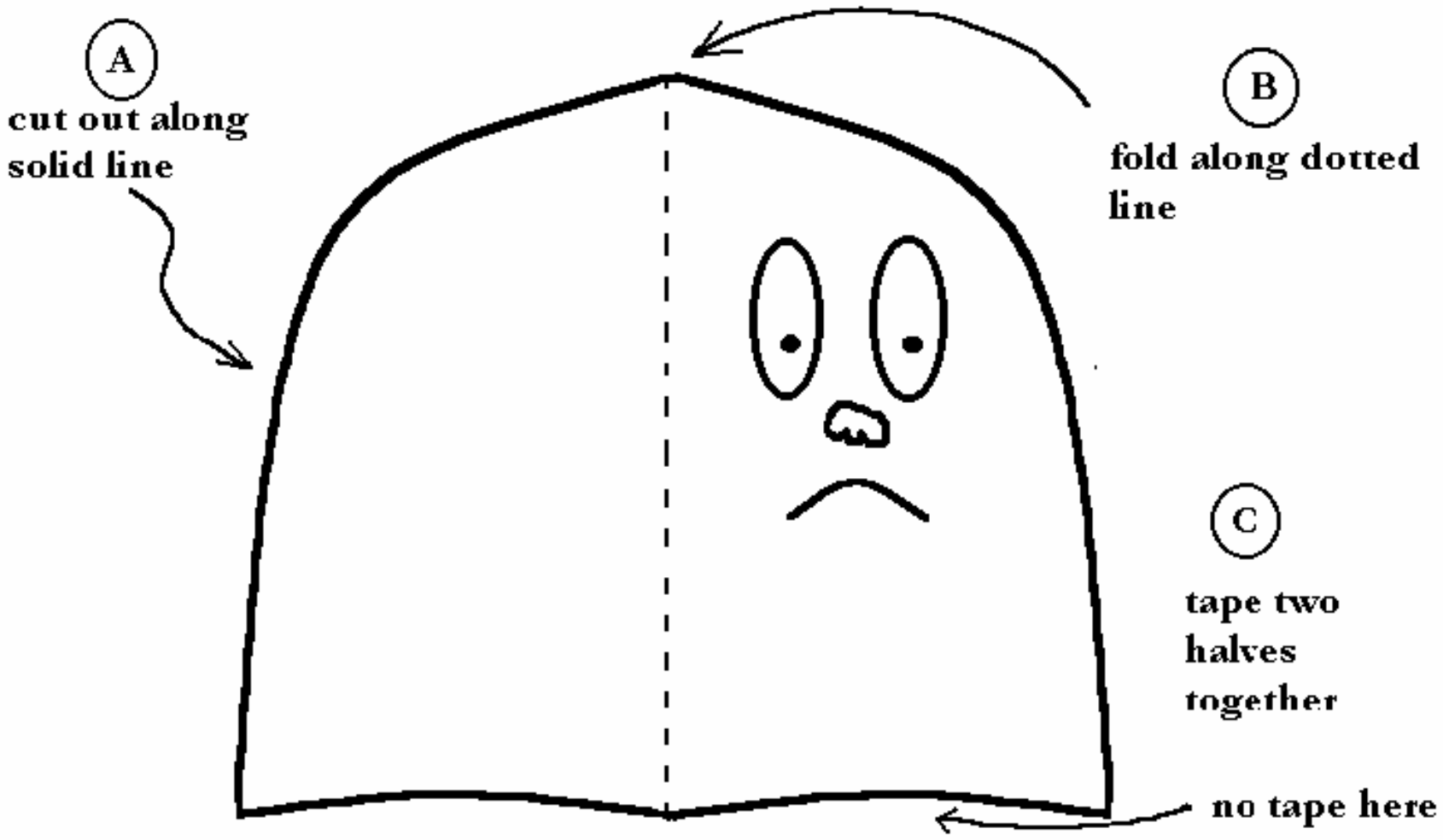
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